United States Antarctic Program

Lean Antarctica

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Date: September 13, 2007

Raytheon
Polar Services

Lean Antarctica?—How We Got Here!

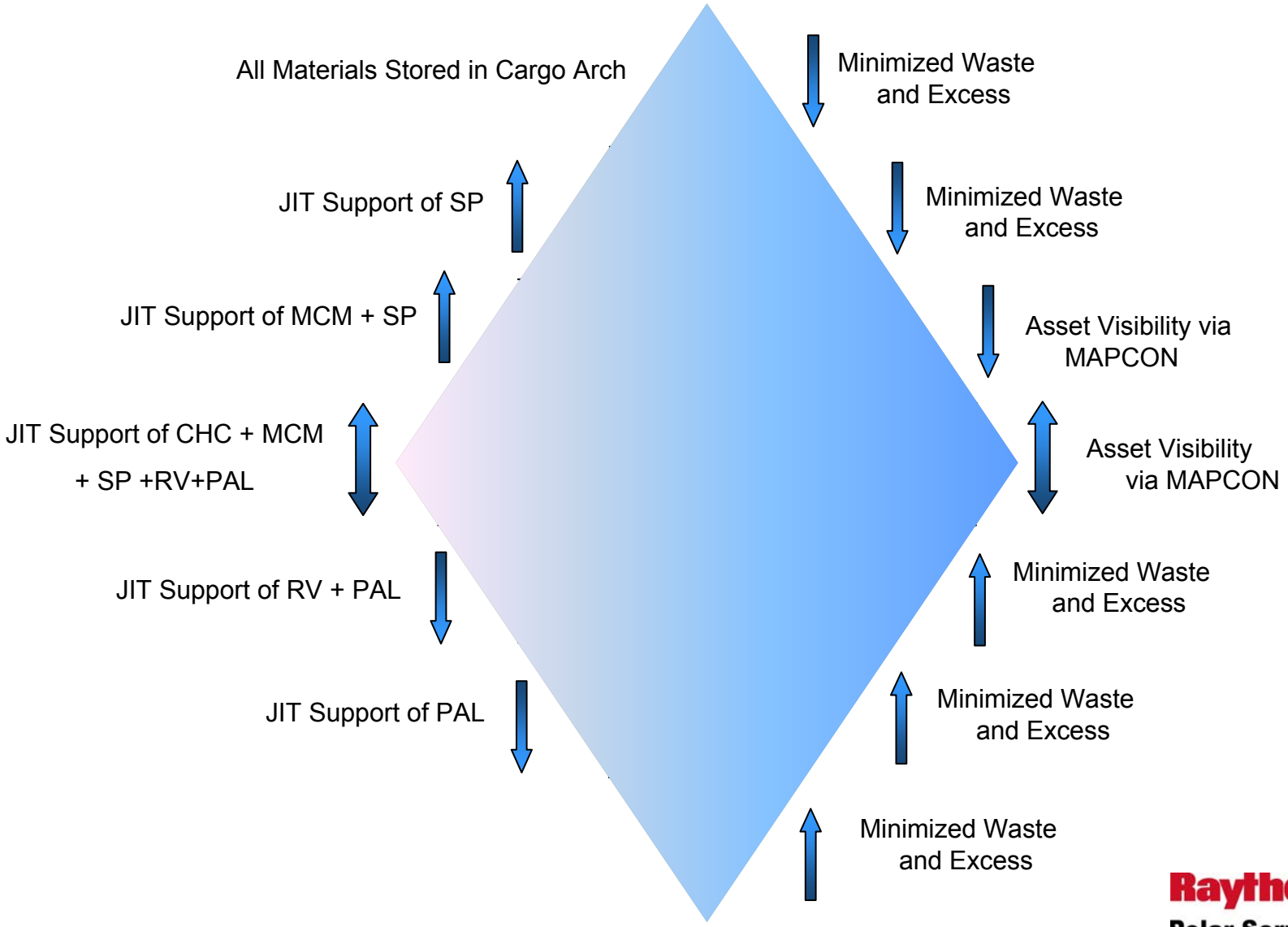
- It Started With
  - Maintain year around presence at Antarctic Stations
    - In one of the most remote locations in the world
  - Lack of transportation opportunities
    - Lead to Just-In-Case stocking practices
  - Resulted in Obsolete and Excess Materials
    - 29 Structures used in part or whole as warehouses
    - 93 Outside storage areas requiring approximately 10 acres
- Next Step—Optimize Supply Chain to Reduce costs
  - Reduce on-continent inventory, labor and infrastructure investment
  - Retain minimum stock items on site
  - Move other required stocks to off-site storage
  - Dispose of unneeded items
- Results
  - Reduced holding costs
  - Reduced footprint
  - Improved appearance

AGENDA

- Lean USAP Concept
- Just-in-Time (JIT) Supply Chain
- RPSC Supply Strategy
- Lean UASP Opportunities Under Review
- Remove Waste from South Pole
- Waste Minimization In the USAP
- Lean McMurdo
- Receiving/Expediting at PTH
- MAPCON Installed at CHC & PTH
- CHC Warehouse
- PTH—Node in Palmer Supply Chain
- Discussion

Lean USAP – Concept

A Supply Chain Concept of Operation that Enables Just-In Time Delivery of Material while Supporting the Lean Operation of the USAP Mission



Just-in-Time Supply Chain

- Definition
  - Deliver planned materials when they are needed while minimizing holding costs (inventory investment, labor, and infrastructure)
- Current Applications
  - South Pole decouple materials
  - South Pole materials that winter in McMurdo
  - South Pole resupply from McMurdo
  - Resupply vessel materials
- Future Additional Applications
  - S.Pole Class Code B items stored in McM
  - McM B and S.Pole C materials held in CHC

Already doing limited JIT for South Pole

Just-in-Time Supply Chain

- Benefits
  - Reduce footprint,labor,facility and maintenance costs
  - Better use of footprint and on-station resources
- JIT Statistics ’06-07
  - South Pole resupply from McMurdo: 393,000 pounds
  - South Pole Winter-over vessel cargo held In McMurdo: 1 million pounds
  - South Pole decouple food: 255,000 pounds

Did not have to bring in 393,000 lbs from CONUS because it was sitting at McM

RPSC STORAGE STRATEGY

- Replace Just-in-Case Inventory Levels
  - Sparing for any eventuality
- With Just-in-Time Inventory Levels
  - Sparing for known requirements and critical spares
  - Requires Culture change
  - Requires paradigm shift
- Supply Chain Changes
  - Front end changes
  - Baseline Inventory:
    - 5 mos summer from CHC with available airlift
    - 8 mos winter with vessel
    - Resupply quantities based on demand history and adjustments for future requirements
    - Level load procurement activity across the year
  - Back end changes
    - Classify all inventory items by Category A, B or C
    - Retrograde excess and obsolete materials and reposition reasonable levels of low velocity materials
    - Create storage space in McMurdo and Christchurch for South Pole low velocity material

RPSC STORAGE STRATEGY

- Classification Codes
  - Class Code A
    - On-site storage
    - High velocity, mission critical or South Pole items
  - Class Code B
    - CHC storage
    - Items with usage only in the past 2 – 5 years
  - Class Code C
    - TBD to most appropriate storage location
      - Items with usage only in the past 5 years or longer

One of a kind Delta Transmission (4 ea)
1 stays – balance to CHC

ABC Inventory Classification—South Pole

- Reduce On-Site Inventory
  - Everything must fit into Logistics Facility
    - Retrograde everything else
  - Classify inventory at South Pole into A,B,C Class Codes
    - Data clean-up required before class code assignment (estimated 35% - 40% obsolete records)
  - Goal: McMurdo becomes South Pole's on-continent source for resupply

74,000 Lines to be analyzed

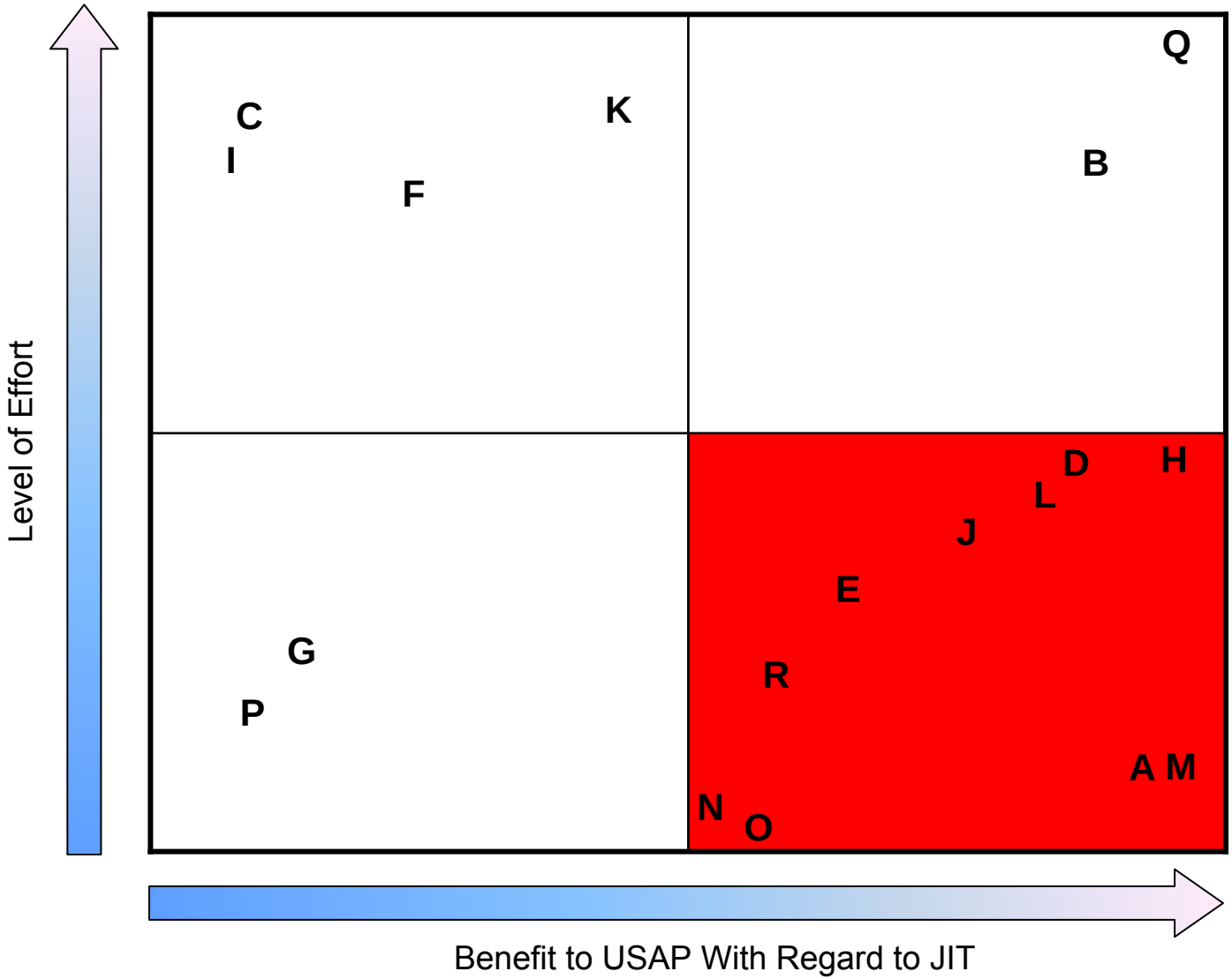
Lean USAP Opportunities Under Review

A. ABC Inventory Classification at the South Pole
   i. 1,3,5 year issue history
   ii. Determine excess material
   iii. Incorporate CMP into SP (6,000 line items)
B. Remove Excess South Pole Material
C. Dome Retrograde
D. Remove Waste from SP
E. Waste Minimization of the USAP
F. Reclaim SP and MCM Direct Turnover Material
G. South Pole Airdrop Planning
H. Lean McMurdo
   i. Empty 4 buildings during '07-08 season
   ii. Remove excess material from 5 areas ~40,000 line items
I. Create Property Plan – FAR 45 Compliant

Lean USAP Opportunities Under Review

J. CHC Warehouse
   i. Set-up, size, infrastructure
K. Increase NZ Procurement
L. MAPCON Installed at CHC and PTH
M. Receiving/Expediting Performed at PTH
N. Identify Additional Warehouse Space requirements at PTH for “C” Items
O. Publish RPSC Supply Policy Statement
   i. A,B,C, emergency spares inventory and length of storage
P. PTH as a Node in the Palmer Supply Chain
Q. Eliminate PTH
R. FOB CHC Analysis by RTSC for COMSUR + COMAIR

Lean USAP Action Items



Focus on Low LOE,
High Benefit first

Supply Chain Initiatives – Execution Underway

Project	Lead	Completion Date	Notes
A. ABC Inventory at South Pole - Issue History ✓ - SP CMP	P. Douglas	20-Jul 31-Aug	Jim Ross to complete CMP catalog x-reference
D. Remove Waste from SP – Plan ✓ - Execution	P. Douglas	6-Jul Station Close 2008	Implementation of plan contingent on finding resources (space, food) for work crews
E. Waste Minimization Plan for USAP	M.Embree	Complete	PTH packaging reduction, consolidation of shipments and reusable containers
H. Lean McMurdo Excess Material Removal Plan ✓	M.Embree D. Kimmes	29-Jun	Option 3 in App, Option 1 proposed to NSF
J. CHC Warehouse Setup - CMP items to fill - VMF Study	K. Chuck M. Embree F. Lehn	Jan 2008 13-Jul 31-Aug	Shelving located for WH setup.
L. MAPCON Installed at: - PTH ✓ - CHC	D. Gitt F. Mendoza P. Brien	 15-Jul 15-Sept	Mike E. to update with Felix – limited capability to use MAPCON at PTH now
M. Receiving/expediting at PTH	F.Lehn	8-Aug	Expediter in place within 3 weeks
N. PTH Warehouse Additional Space	M. Embree	6-July	Proposed for Palmer class C items
O. RPSC Supply Strategy	C. DeZafra	11-Aug	Policy to be updated – no storage of C material at PTH
Material Program Plan Updates	F. Lehn	31-Aug	Level load by moving requisitioning and procurement to the left

Lean Antarctica Timeline

Task Name	Start	Finish	Jul '07	Aug '07	Sep '07	Oct '07	Nov '07	Dec '07	Jan '08	Feb '08	Mar '08	Apr '08	END DATE
RPSC Storage Policy	########	########											
USAP Waste Minimization Plan	########	########											
Analyze SPole ABC	########	########											01/30/2009
CHC Warehouse Phase I	########	########											02/28/2008
Lean MCM Material Removal & Retrograde	########	########											09/30/2008
SP Waste Removal Plan Complete	########	########											
SP Waste Removal	########	########											02/29/2008
MAPCON Installed at PH & CHC	########	########											
Receiving Capability at PH Established	########	########											12/01/2007

Remove Waste From South Pole

- Long Term Goal
  - Wood, packaging materials, food, recyclables
  - Relocate C Inventory—after inventory classification
  - Retrograde excess and obsolete material for disposal or resale
- Resources Required to Eliminate Backlog for FY08
  - Require an additional 9.6 labor weeks (ROM)
- Recommendation
  - Shredder
  - Traverse
  - Use current SPSM materials personnel, if available
  - Deploy Resources from MCM to S. Pole when bed space permits (NSF priority?)

Remove Waste From South Pole

SP WASTE BACKLOG PROJECTIONS

FY07 Actual		FY08		FY09	
Demo Retrograde	438,112	Demo Retrograde	613,392	Demo Retrograde	1,513,472
Sustaining Retro	1,085,415	Sustaining Retro	1,085,415	Sustaining Retro	1,085,415
Previous Season Backlog	224,000	Previous Season Backlog	172,800	Previous Season Backlog	71,607
Total	1,747,527	Total	1,871,607	Total	2,670,494
Backlog	172,800	Backlog	71,607	Backlog	870,494
FY10		**FY11**		**FY12**	
Berm Retrograde	818,320	Berm Retrograde	818,320	Demo/Berm Retrograde	0
Sustaining Retro	1,085,415	Sustaining Retro	1,085,415	Sustaining Retro	1,085,415
Previous Season Backlog	870,494	Previous Season Backlog	974,229	Previous Season Backlog	1,077,964
Total	2,774,229	Total	2,877,964	Total	2,163,379
Backlog	974,229	Backlog	1,077,964	Backlog	363,379

Bermed Wood Waste

Waste Wood Waiting to be Cut to Size

Waste Minimization of USAP

- Remove unnecessary vendor packaging at PTH
  - Further potential packaging reduction for S. Pole in McM
- Re-usable shipping materials
  - Knock-down boxes
    - Wooden food boxes (sized for cargo arch)
    - Boxes for consolidated packs (Proto-type in ’07-08)
- Consolidated packs
  - Reduces over-packing
  - Reduce partial vendor deliveries to PTH

Lean McMurdo – Accelerated Retrograde Cost Options

	Option 1	Option 2	Option 3 – Current APP
Seasons	Austral Summer '07 Austral Winter '08	Austral Summer '07 Austral Winter '08	Austral Summer '07
Empty Buildings	S-07: B087, B342 W-08: B-342, 344, 345	S-07: B087, B342 W-08:B344 & B345	B-087
Line Items Retro'd	S-07: 5,000 W-08: 3,000	S – 3,000 W – 2,000	S - 3,500
Target Items	All Excess CMP Class C	All Excess CMP Class C	All Excess CMP
Staff Summer '07 Winter '08	 On Ice: 9; DHQ: 2 FT On Ice: 11; DHQ: 2 FT	 On Ice: 8; DHQ: 1 FT On Ice: 7; DHQ: 1 FT	 On Ice: 4; DHQ: 0 FT On Ice: 0; DHQ: 0 F T Note: Retro PM not Incld
CHC Storage Stand Up Cost: Schedule:	3 Week TDY	3 Week TDY	3 Week TDY
Total Cost	**$828,683**	**$566,853**	**$112,380**

Receiving/Expediting At PTH

- Why MAPCON Receiving at PTH?
  - Faster inventory visibility
    - Establish ABC Inventory Location
    - Facilitate resupply analysis

Eliminate 1 summer & 3 winter on-ice staff in FY09

- Receiving will be defined as:
  - Invoice receiving in Power 1000--correct quantity and description plus quality
  - Inventory receiving in MAPCON
- Labor increase of 3 heads at PTH to support receiving function
  - 1 Expediter – Re-classified vacant clerk position.
  - 3 Receiving Clerks
    - Plus temporary help during October – December surge
    - Trade off from MCM labor, move 104 weeks off ice
- **Perform MAPCON receiving Beta test at PTH (Sept. 24-Oct 17)**
- Stand-up receiving operation December ‘07

MAPCON Installed at CHC & PTH

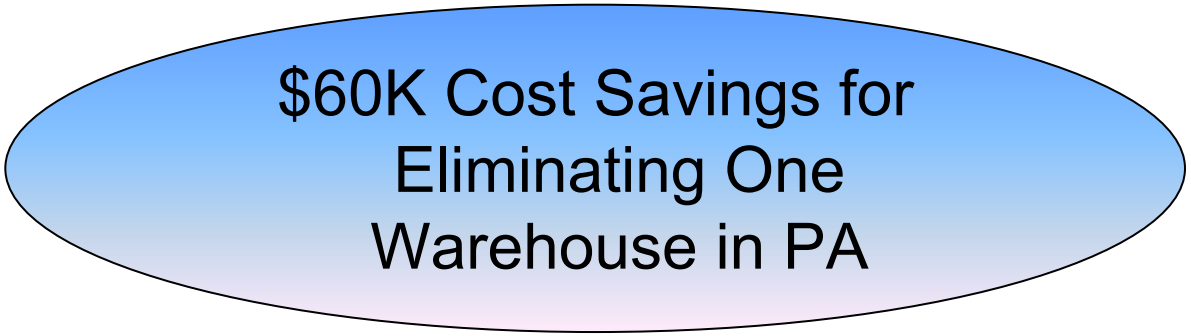
- Challenges: CHC & PTH Communication with Stations
  - Replication of databases is the bottleneck
- Tested Direct Access to On-Station MAPCON Module
  - McMurdo: limited test provided acceptable response time
    - Not tested during peak period
      - May require more bandwidth during peak period
  - South Pole: Questionable due to period of availability and bandwidth
  - Palmer: to be tested
- Anticipate Minor Cost for Additional T1 Lines, Etc.
  - Cost analysis in progress

CHC Warehouse Phase I

- Storage
  - Remote McMurdo stockroom
  - 4,000 sq.ft. available now – (Old Dispensary)
    - Have some GSA excess shelving
- Stand Up
  - March 2008
  - Shelving delivered to CHC via resupply vessel Jan 08
  - McMurdo stock transferred to CHC via resupply vessel Feb 08
  - Stand up MAPCON in CHC TBD
  - Redeploying Supply full time person to train CHC personnel to manage inventory

PTH—Node In Palmer Supply Chain

- Revise Peninsula Area Storage Plan
  - Eliminate excess/obsolete material from PA warehouses & Palmer Station & relocate to PTH
    - From PA warehouse: i.e. drums, lumber
  - Reduce Palmer Station footprint



SUMMARY

- Just-in-Time (JIT) Supply Chain
- Remove Waste from South Pole
- Lean McMurdo
- Receiving/Expediting at PTH

Need NSF Decision

- Accelerated Retrograde Options
- Receiving in PTH
- MAPCON in PTH and CHC
- Shredder